the tendrils of *Parthenocissus quinquefolia* (Linn.) Planch. (Ampelopsis quinquefolia Michx.)

From the results of investigation by Haberlandt, Pfeffer, Hofmeister, MacFarlane and others, on various plants showing "contact movements," it appears that none have developed the contact sense in such a manner as to be able to distinguish portions of its own or similar plant bodies from foreign objects, as would be implied in the results of Darwin's observations. Some of the workers named, however, have quoted this statement of Darwin's, but apparently without having confirmed it by actual experiment or observation.

In general it may be safely said that tendrils distinguish only the force of the impact, and roughness of the surface of a body coming in contact with them, and the assertion is hazarded that the inter-reaction of tendrils will be found present in all tendril plants having a habit of dense, vigorous growth.—D. T. MacDougal, *Botanical Laboratories, University of Minnesota.*

CURRENT LITERATURE.

The power of bacteria to penetrate vegetable tissue.

An admirable and much needed piece of work has been done by Dr. H. L. Russell,[1] now of the University of Wisconsin, in adding to and setting in order the scattered knowledge regarding the power possessed by bacteria to penetrate and induce pathological changes in healthy vegetable tissues. He finds from his own researches, what has already been held as highly probable by many vegetable pathologists, that "normally, the healthy plant with intact outer membranes is free from bacteria within its tissues." But this is not due apparently to any marked germicidal properties of plant juices, and in this respect there is a great difference between plants and animals. Many species of bacteria, including animal parasites, plant parasites upon other hosts than those in which they are parasitic, and saprophytes, more especially the last, are able to live for some time, when artificially inoculated, and even to spread through the tissues to a limited extent. In such cases no evident pathological changes are brought about, and the intruding germs eventually disappear.

The method by which germs effect their distribution, which is almost invariably from one cell cavity to another, and not intercellular,

[1] Russell, H. L.: Bacteria in their relation to vegetable tissue; a dissertation presented to the board of university studies of the Johns Hopkins University for the degree of doctor of philosophy. 41 pp. Roy. 8vo. Baltimore, 1892.

was not definitely ascertained; it does not, however, appear to be dependent upon the currents of water in the plant, but is much more closely correlated with the actual growth of the germs.

Only truly parasitic bacteria appear to have power to penetrate the uninjured surface of plants, and not all of this class.

The author does good service by clearly distinguishing between the *resistance* which plants in general exercise toward the inroads of bacteria, and the *immunity* which certain groups of plants are able to maintain toward bacteria that are pathogenic in closely related sorts. The ability of plants to resist the attacks of bacteria is due to both physical and chemical causes. Of the former are "the epidermal and cortical resistant tissues, matured and thickened cell walls of the inner tissue, exclusion by gummy exudates, etc.," and of the latter "the chemical reaction of the juices, the unfavorable conditions of nutrition, the action of the living protoplasm, etc." "The whole question of immunity of plants from bacteria is much more closely related to the same question as regards fungi than it is to the subject of immunity as seen in the animal kingdom."

In an appendix the author has tabulated the prominent facts regarding the several diseases of plants (1) that are with much certainty established as bacterial (thirteen in number) and also (2) of those ascribed to bacteria but the causal relation still uncertain (nine in number). It is interesting to compare this list with that given by Dr. Migula[2] recently. The latter author admits but five into his list of clearly demonstrated bacterial diseases: pear blight, sorghum blight, corn blight (Burrill), rot of hyacinth (Heinz), wet rot of potato (Kramer). Of the remaining eight of Russell's first list, three are European and excluded by Migula, and five are American and evidently unknown to him.

Most of the work in the study of bacterial diseases of plants has been done by Americans, and it is gratifying to have another important paper added upon the subject, also by an American.

Minor Notices.

A SUMMARY of the species of true yeasts, the spore-bearing Saccharomyces, twenty-two in number, is given in the August issue of the *American Naturalist*, by J. Christian Bay.

A LECTURE upon combating the fungous diseases of plants, delivered before the Massachusetts Horticultural Society by Mr. B. T. Galloway, Chief of the U. S. Division of Vegetable Pathology, has recently been distributed. It is an instructive presentation of the subject.

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[2] MIGULA: Kritische Uebersicht derjenigen Pflanzenkrankheiten, welche angeblich durch Bakterien verursacht werden. Semarang, 1892.